TITLE OF THE INVENTION

COLLAPSIBLE STEERING COLUMN ASSEMBLY FOR A VEHICLE

BACKGROUND OF THE INVENTION

[0001] This invention relates to a collapsible steering column assembly for a vehicle.

DESCRIPTION OF THE PRIOR ART

[0002] A vehicle steering column assembly is required to collapse in a controlled manner in the event of a vehicle crash. During a crash event, the steering column assembly should be able to accommodate collapse from the front of the vehicle, for example in order to accommodate intrusion of an engine compartment firewall and, in addition, the assembly should also be able to collapse away from the driver of the vehicle.

SUMMARY OF THE INVENTION

[0003] According to the present invention, there is provided a collapsible steering column assembly for a vehicle, the assembly including a steering column mounting bracket itself being mountable on a vehicle body part, there being a deformable component that is joined to the mounting bracket and that can collapse in the event of vehicle crash thereby to absorb energy.

[0004] The deformable component can be integral with the mounting bracket.

[0005] The mounting bracket can support upper and lower subassemblies of a steering column. The upper and lower subassemblies can be slidably mounted one on the other.

[0006] The deformable component may be restrained in its normal positional relationship with the mounting bracket by at least one locating means. The locating means can comprise at least one slot in one of the mounting bracket or the deformable component and a locating pin on the other of the mounting bracket or deformable component. There may be two such slots and mating pins. The or each slot may be an open slot.

[0007] The deformable component can comprise at least one stiff strip so configured as to provide a region of weakness about which the strip can be bent and thus collapsed upon receiving a compressive force along the length of the strip. One end of the strip may be joined to the mounting bracket and the other, free end of the strip may form a mounting for a pivot member. The pivot member may support a universal joint bearing assembly of the steering column.

[0008] The steering column assembly may provide for rake and/or reach adjustment of the steering column.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic perspective view of part of a collapsible steering column assembly shown in a condition before a vehicle crash; and

Fig. 2 is a view similar to Fig. 1 but showing the assembly in a condition that it can adapt after a vehicle crash.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] The steering column assembly includes upper and lower column subassemblies 1, 2, which are slidable one within the other, relative rotation between the two subassemblies being prevented, for example, by a spline interface (not shown). A steering wheel (not shown) will be attached to the upper end of the upper subassembly 1, whilst the lower end of the lower subassembly 2 is coupled to a pivot member 3 in the form of a bracket, the pivot member 3 carrying a yoke of a universal joint.

[0011] The pivot member 3 is pivotally linked by pins 4 to part of a steering column mounting bracket 5 that is fixedly mountable on a vehicle body part such as a cross-beam (not shown).

[0012] The upper subassembly 1 includes an upper steering column tube 6 mounted on a support bracket 7 that is itself slidably mounted on a second, support bracket 8 so as to allow, in normal operating conditions of the steering column assembly, reach and/or rake adjustment of the steering column. Means (not shown) are provided therefore to clamp the support bracket 8 to the support bracket 7 once the reach and/or rake adjustment of the steering column has been made.

[0013] As mentioned, in the event of vehicle crash, the steering column assembly should be able to accommodate collapse from the front, i.e. by intrusion of a firewall (not shown) and this is arranged to act on a deformable component 9 in the form of two metal strips 9A extending from the mounting bracket 5 itself.

[0014] In the embodiment shown, it will be seen that the two strips 9A are actually part of the mounting bracket 5 but each is split from it in the regions indicated by the reference numerals 10 but is fixed on itself in those regions 10 by devices 11. These devices 11 are in fact pins which are fitted in respective open, angled slots 12 (Fig. 2) in an upper plate of the mounting bracket 5.

[0015] Each strip 9A is provided with bent or crimped regions 9B which provide regions of weakness to allow the strips 9A forming the deformable component to collapse in the event of end-on forces on the strips.

[0016] Accordingly, the steering column assembly is connected to the mounting bracket 5 through the pivot bracket 3 and the deformable component 9. The regions 9B

of the deformable component of the mounting bracket therefore have predefined configurations which, in normal use, have no effect on the function of the steering column.

[0017] However, in the event of vehicle crash, the forces generated will be sufficient to act on the deformable component 9 and thereby allow for intrusion of the firewall. As can be seen in Figure 2, the forces generated will dislocate the locating pins 11 from their retaining slots 12, which are angled towards the direction of applied force so that the pins are released and the deformable regions 9B of the strips 9A initiate the deformable component 9 to collapse on itself. This thereby allows the firewall to displace the lower (front) end of the mounting bracket 5 and also any brackets connected in this area, such as the pivot bracket 3.

[0018] The locating points comprising the pins 11 and slots 12 can be formed as clamping devices to provide further controlled load in the region of the deformable component.

[0019] It will be appreciated that the present arrangement allows for a predefined collapse direction to be achieved whilst enabling a predictable system to be constructed as regards loads generated. Also, intrusion displacement of the firewall can be achieved thereby without the requirement of additional brackets, for example.